

Scientific Approach of Food and Nutrition Using Discriminant Analysis for Leading Fit Life

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Abstract

The health of the person is the most important assets in life. Majority of the people in this world ignoring this fact knowingly which leads to make them their life cumbersome. The person who is mentally and physically healthy wisely takes the decisions in his life. The health and fitness of body depends upon the nutrition, calories utilization and life style adaptability. The body needs the balance combinations of nutrients and diet should be balanced accordingly.

In this study the scientific approach of fit body using the statistical, engineering and psychological methods have been utilized which leads to fit life. The computation of BMI, PFI and UCB with NDS have been done. Rigorous experimentation have been done using different data sets and it gives amazing results by diagnosis fit and unfit and the appropriate plan have been suggested accordingly.

Keywords: Food, Nutrition; Fit body; Nutrients; Discriminant Analysis; BMI; PFI.

Introduction

Our body needs different kinds of food for some special purpose. Each food item usually made up of one or more ingredients which we get from plants and animals. These ingredients contain some components that are needed by our body. These components are called as nutrients. The major nutrients in the food are named carbohydrates, proteins, fats, vitamins and minerals.

In addition, food contains dietary fibres and water which are also needed by our body. Is the food contains all the nutrients, is the immediate question, comes into the mind. With some simple methods we can test whether cooked food or a raw ingredient contains one or more of these nutrients. The test for presence of carbohydrates, proteins and fats are simpler to do as compared to the test of other nutrients.

The main carbohydrates found in our food are in the form of starch and sugars. For testing the starch, take a small amount of food item or raw ingredient and put 2-3 drops of dilute iodine solution on it. If it turns blue-black, indicates that it contains starch. Similarly, for testing the protein, make a paste of it, if solid by adding water then add few drops of solution of copper sulphate and 10 drops of solution of caustic soda. If it turns violet indicates the presence of protein. For testing the fat, take a small quantity of food item wrap into a piece of

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paper and crush it. If the paper is having the oily patch it shows the fat presence. All the nutrients not present in all food items. Except carbohydrates, fats, proteins, vitamins the minerals and water are also present in various food items.

Carbohydrates mainly provide energy to our body. Fats also give us energy compared to same amount of carbohydrates. Fats and carbohydrates are called as 'energy giving foods'. Proteins are needed for the growth and repair of our body. Protein are often called as body building food. Vitamins help in protecting our body against diseases. Vitamins also help in keeping our eyes, bones, teeth and gums healthy. Vitamins are of different types Vitamin A, Vitamin C, Vitamin D, Vitamin K and Vitamin B Complex. Vitamin A keeps our skin and eyes healthy. Vitamin C helps body to fight against many diseases. Vitamin D helps our body to use Calcium for bones and teeth.

Besides these nutrients, as said earlier also that our body needs dietary fibres and water. Dietary fibres are also called as Roughage. Roughage does not provide any nutrient to our body but is an essential component of our body. This helps our body get rid of undigested food. Water helps our body to absorb nutrients from food. It also helps in throwing out some wastes from body as urine and sweat. The food normally eaten by human being is the diet.

Methodology

Discriminant Analysis

Discriminant Analysis is a statistical method⁷ to separate between distinct classes in multivariate data. It establishes relationships between attributes for classifying objects into one of the several populations, by identifying attributes that best discriminate between the members of the group. In this method, one can judge the maximum discrimination of the object to the specific group through the discriminant score.

For growth and maintenance of good health, our diet should have all the nutrients that our body needs, in right quantities. Such a diet is called the balance diet.

Deficiency of one or more nutrients can cause disorders in our body. Diseases that occurs due to lack of nutrients over a long period are called deficiency diseases (Table 1).

Table 1: Nutrients Deficiency

Vitamins/ Mineral	Deficiency disease/disorder	Symptoms
Vitamins A	Loss of Vision	Poor vision, loss of vision in darkness, sometimes complete loss of vision
Vitamins B	Beriberi	Weak muscles and very little energy to work
Vitamins C	Scurvy	Bleeding gums, wounds take longer time to heal
Vitamins D	Rickets	Bones becomes soft and bent
Calcium	Bone and tooth decay	Weak bones, tooth decay
Iodine	Goiter	Neck appear swollen mental disability in children
Iron	Anaemia	Weakness

Basal Metabolic Index (BMI)

The body composition analysis defines for Basal Metabolic Index. This is the energy utilized by the individual to carry on vital body functions when at rest. Body Mass Index⁶ was derived by measuring weight and height of the individual using the following formula (Table 2)

$$\text{BMI} = \text{Weight (kg)} / \text{Height}^2 \text{ (m)}$$

Table 2: BMI Table

BMI Range	Presumptive diagnosis
<16.0	CED Grade III (Severe)
16.0-17.0	CED Grade II (Moderate)
17.0-18.5	CED Grade I (Mild)
18.5-20.0	Low weight normal
20.0-25.0	Normal
25.0-30.0	Obese Grade I

Physical Fitness Index (PFI)

The physical fitness is a term which denotes individual's ability to accomplish a given task in a given time period. The person should be healthy and should not have respiratory problems, and should be given at least 15 minutes of rest before the start of measurement. Physical fitness^{4,5} is the state of health of individual, to calculate PFI, the person were asked to perform the exercise for 5 minute, then the heart rate (HR), at the end of I, II and III minute of recovery and then PFI is assessed by using the following equation:

$$\text{PFI} = (\text{Duration of activity} / 2(\text{sum of I, II and III minute of recovery of HR})) * 100$$

Respondents ranked from poor to excellent on the basis of PFI as follows in Table 3.

Table 3: PFI Values

PFI grade	PFI range
Poor physical	≤80
Low average fitness	81-100
High average fitness	101-115
Good fitness	116-135
Very good fitness	136-150
Excellent fitness	Beyond 150

Experimentation

Rigorous experimentation¹⁻³ with survey analysis have been conducted by collected the data by considering various parameters and attributes.

To achieve the fit life though the fit body is done by discriminant analysis⁷ by taking all the parameters into consideration. The measurement of the BMI, PFI and NDS (Nutrients Deficiency Syndrome) have been obtained. The above method is the scientific method to be fit after diagnosis by utilizing the above methods into various

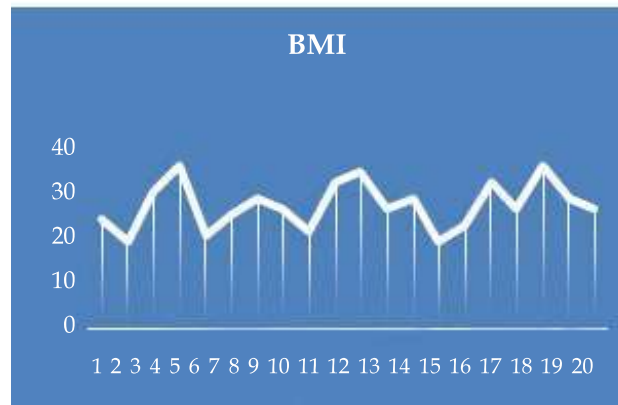
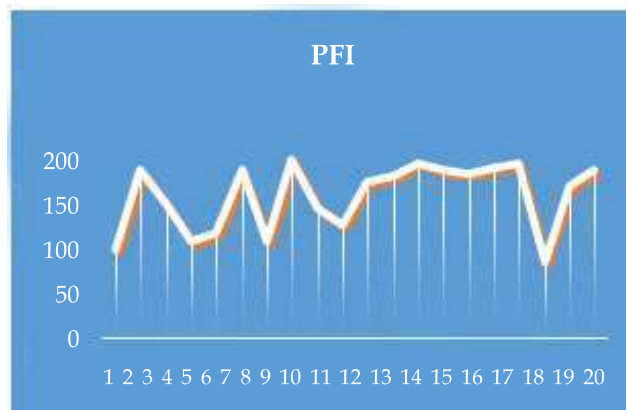
categories of fit and unfit. If the person is fit he/she maintains the healthy status and if the person is unfit according to this method he has to overcome by keeping fit by adapting the suggestions given in this study (Fig. 1).

The persons who are having fit body i.e. healthy body leading the fit life. Those by this method got the unfit status due to inappropriate life style and unbalanced calorie balance (UCB). They are advised and suggested to intake the calorie requirement as needed and prescribed according to their body fitness status for achieving the fit body and fit life (Fig. 2).

To determine the amount of calories you need to achieve a fit body need to maintain the normal weight. For this the assessment of daily activities and lifestyle also matters.

$$\text{Total Calories} = \text{BMI} + \text{Life Style} + \text{Activity}$$

In order to maintain normal weight one has to balance the required calories per day and balance the Unbalanced Calories Balance (UCB).

**Fig. 1:** BMI Measures**Fig. 2:** PFI Measures

One should never skip a meal. Doing so will reduce BMR, making the person inactive. The person will tend to over eat at the next meal. Instead, have smaller more frequent meals at regular intervals (Fig. 4).

Always have breakfast as it is the most important meal of the day when the nutrient requirements are the highest and a proper breakfast will energize throughout the day. Don't fall asleep soon after the dinner as sleep slows down the body's metabolism and one tend to burn fewer calories and accumulate fat. Instead have a light and early dinner and give yourself a 2 to 3 hours gap before going to bed. Activity patterns also matters. Diet completed with physical activity is better for managing weight and fro better health (Table 4).

The energy utilization for certain activities are listed below.

Table 4: Activity Utilization

Activity	Calories
Jogging or running for 1 Hour	600 Kcal
Cycling for 1 hour	450 Kcal
Tennis or any game	350 Kcal
Walking for 1 hour	180 Kcal

Besides calorie expenditure, physical activity contributes to the total health status of the individual.

Whatever your age, whatever your level of fitness walking is the simplest and most effective form of activity. Regular walks will slowly improve your heartbeat, endurance and all-round level of fitness. Calorie requirements for different age groups are

as follows (Table 5)

Table 5: Calories Requirements

Groups	Cal Req. (Kcal)
Men (Sedentary)	2425
Woman (Sedentary)	1875
Woman (lactating)	
0-6 months	2425
6-12 months	2275
Boys (16-18 years)	2640
Girls(16-18 years)	2060

Conclusion

The fitness of body and mind leads to fit life. Majority of the healthy people in this world are happy because they can give the best to their work. The karma is the most important as written in all religious holy books. If one is doing karma and psychologically a kind of work satisfaction comes or urge to do more work also arises. Through work if he is earning and enjoying the luxurious life or spending the money for charity that also gives a

kind of happiness. So in reality everything is correlated. Even in the age of artificial intelligence where the robots work like humans, human should have that nerve cells and brain to think and develop the robots so,in turn, health is not the issue to be ignored. With balanced diet, life style with balanced nutrient utilization the person can reach the optimum of success and happiness. This way not only the body, mind but also the soul will be happy.

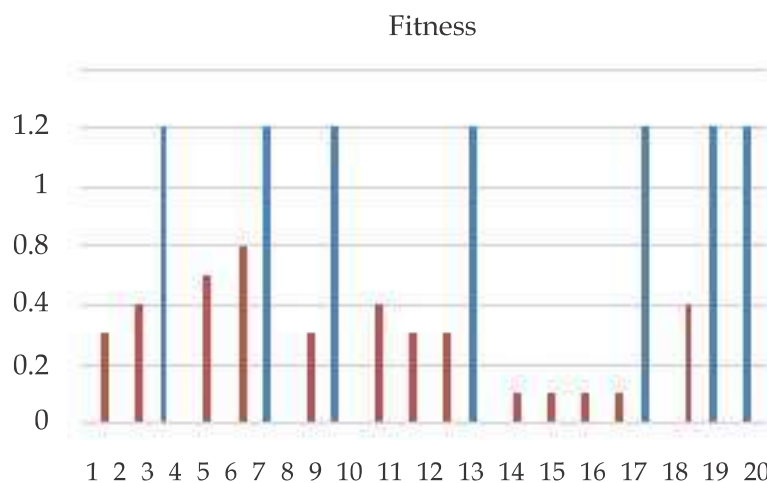


Fig. 3: Fitness Measures

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It is health that is real wealth and not pieces of gold and silver"
- Mahatma Gandhi